INVESTIGATOR'S ANNUAL REPORT

United States Department of the Interior

National Park Service

All or some of the information you provide may become available to the public.

OMB # (1024-0236)
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Form No. (10-226)

Reporting Year: 2007	**Park:** Shenandoah NP	**Select the type of permit this report addresses:** Scientific Study

Name of principal investigator or responsible official: Gerald Bresowar	**Office Phone:** 828 262-3025
Mailing address: Department of Biology 572 Rivers Street Boone, NC 28608 U.S.A.	**Office FAX** 828 2622127 **Office Email** gb73080@appstate.edu

Additional investigators or key field assistants (first name, last name, office phone, office email)
No co-investigators

Project Title (maximum 300 characters):
A phylogeography of Sibbaldiopsis tridentata

Park-assigned Study or Activity #:	**Park-assigned Permit #:**	**Permit Start Date:**	**Permit Expiration Date:**
SHEN-00336	SHEN-2007-SCI-0005	May 01, 2007	Oct 31, 2007

Scientific Study Starting Date:	**Estimated Scientific Study Ending Date:**
May 01, 2007	Oct 31, 2007

For either a Scientific Study or a Science Education Activity, the status is:	**For a Scientific Study that is completed, please check each of the following that applies:**
Continuing	__ A final report has been provided to the park or will be provided to the park within the next two years __ Copies of field notes, data files, photos, or other study records, as agreed, have been provided to the park __ All collected and retained specimens have been cataloged into the NPS catalog system and NPS has processed loan agreements as needed

Activity Type:
Research

Subject/Discipline:
Plant Communities (Vegetation)

Purpose of Scientific Study or Science Education Activity during the reporting year (maximum 4000 characters):

This project will determine the levels of genetic variation within and among populations of the plant species Sibbaldiopsis tridentata (Rosaceae) found inhabiting the high-elevation grassy balds and rock outcrops of the Appalachian Mountains. Populations will be sampled from the grassy balds of North Carolina, Tennessee and Virginia, as well as from rock-outcrop populations ranging from Tennessee to Maine. Two genes will be sequenced and intra-populational variation will be assessed. These genetic data will be coupled with the geographic data in order to provide a model of historical movement of populations of this species. This project will determine whether populations of S. tridentata display patterns indicative of the post-glaciation range withdraw and subsequently, the population refugia hypothesis. Questions of inter-populational gene flow and recent colonization of habitats will be addressed.

Sibbaldiopsis tridentata is found on high-elevation rock outcrops of the Appalachians, as well as on grassy balds which characterize

southern portions of the region. The species is primarily montane in the eastern U.S., extending from Georgia to a main range in Canada. S. tridentata is largely insular in its distribution in the southeast, becoming contiguous and more widespread in New York and northward. Five states have given S. tridentata an â endangeredâ status, and several others have listed it as a species of special concern. As this plant is a small, insect-pollinated, woody perennial, the insular populations found on the southeastern mountaintops are possibly true genetic isolates.

I will attempt to determine the past movements of populations of S. tridentata by making inter- and intra-populational comparisons throughout the species range. To do this sampling will be done from populations on grassy balds and rock outcrops in the Blue Ridge region of Tennessee, North Carolina and Virginia. Further sampling will be conducted on populations along the Appalachians, from West Virginia to Maine. Assessment of variation along the extent of the species range, along with comparisons of bald versus outcrop variation levels, will provide a multi-faceted dataset from which to analyze the historical movements of this species. In this way I hope to address questions involving the present-day patterns of distribution seen in the Appalachians, including relationships between grassy-bald and adjacent rock-outcrop populations in regard to possible interglacial refugia theory.

Sibbaldiopsis tridentata represents an insular species occupying an unusual and protected habitat. Determination of the varying levels of genetic depth among populations of this species will allow us to identify probable interglacial refugia. These populations represent the greatest regional gene pools. From the phylogeographic analysis of this species we can begin to propose how other rare and endemic northern species populations are patterned. A phylogeographic model for S. tridentata thus has implications for other plant species found in similar habitats, and subsequently implications for the management of the most genetically-diverse populations.

Findings and status of Scientific Study or accomplishments of Science Education Activity during the reporting year (maximum 4000 characters):

In July 2007, the population of Sibbaldiopsis tridentata on the rock outcrops of Big Stoney Man, in the Shenandoah NP, were sampled for research purposes. Leaf material was sampled from 30 individuals, resulting in no significant harm to either the plants or the habitat. GPS location information was taken at the time. All collected samples have since been destroyed in the DNA extraction phase of the project. We now are in the process of optimizing AFLP parameters in order to assess intra-populational variation.

For Scientific Studies (not Science Education Activities), were any specimens collected and removed from the park but not destroyed during analysis?

No

Funding specifically used in this park this reporting year that was provided by NPS (enter dollar amount):	**Funding specifically used in this park this reporting year that was provided by all other sources (enter dollar amount):**
$0	$0

List any other U.S. Government Agencies supporting this study or activity and the funding each provided this reporting year: